CLAIMS

1. A method of identifying one or more bacteria from a sample, wherein the one or more bacteria is suspected to be present in the sample, the method comprising:

providing an aqueous suspension comprising a bacteria-SERS nanoparticle complex, wherein the bacteria-SERS nanoparticle complex comprises (i) a SERS nanoparticle and (ii) the one or more bacteria suspected to be present in the sample, wherein providing the aqueous suspension comprises dispersing the sample in an aqueous medium, and mixing the sample in the aqueous medium with the SERS nanoparticle, wherein the sample suspected to contain the one or more bacteria is mixed with the aqueous medium at a volume ratio in a range of more than 0 and up to 2;

depositing the aqueous suspension comprising the bacteria-SERS nanoparticle complex on a substrate having structures coated with a SERS-active material to dispose the bacteria-SERS nanoparticle complex on the substrate;

irradiating the bacteria-SERS nanoparticle complex disposed on the substrate with laser to generate one or more SERS signals;

having a SERS-spectroscopic module operable to render one or more SERS spectral data corresponding to the one or more SERS signals; and

having a process module operable to identify the presence or absence of the one or more bacteria from the one or more SERS spectral data.

2. The method of claim 1, wherein the SERS nanoparticle comprises silver and/or gold.

3. The method of claim 1 or 2, wherein the sample suspected to contain the one or more bacteria is mixed with the aqueous medium at a volume ratio of 0.5.

4. The method of any one of claims 1 to 3, wherein the bacteria-SERS nanoparticle complex and the structures are absent of an antibody, a ligand and an aptamer.

5. The method of any one of claims 1 to 4, wherein the structures comprise nanopillars.

6. The method of any one of claims 1 to 5, wherein the SERS-active material comprises silver and/or gold.

7. The method of any one of claims 1 to 6, wherein depositing the aqueous suspension on a substrate is carried out such that the one or more bacteria is positioned between the SERS nanoparticle and the structures.

8. The method of any one of claims 1 to 7, wherein the laser comprises a wavelength ranging from 600 nm to 800 nm.

9. The method of any one of claims 1 to 8, wherein having the process module operable to identify the presence or absence of the one or more bacteria from the one or more SERS spectral data comprises training the process module to identify the presence or absence of the one or more bacteria suspected to be present in the sample.

10. The method of claim 9, wherein training the process module comprises feeding multiple SERS spectral data of each respective bacterium suspected to be one of the one or more bacteria in the sample to the process module.

11. The method of claim 10, wherein the multiple SERS spectral data comprises 200 SERS spectra of each respective bacterium.

12. The method of any one of claims 1 to 11, wherein having the process module operable to identify the presence or absence of the one or more bacteria from the one or more SERS spectral data comprises having the process module isolate a set of SERS spectral data which correspond to one bacterium from another set of SERS spectral data which correspond to another bacterium.

13. The method of any one of claims 1 to 12, wherein the one or more bacteria comprise a bacterium from a *streptococcaceae* family, *pseudomonadaceae* family, and/or a *staphylococcaceae* family.

14. The method of any one of claims 1 to 13, wherein the method comprises intrapartum identification of *streptococcus agalactiae* from the sample.